

# Does Your Heart Forecast help practitioner understanding and confidence with cardiovascular disease risk communication?

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## ABSTRACT

**INTRODUCTION:** Explaining what cardiovascular disease (CVD) risk means and engaging in shared decision-making regarding risk factor modification is challenging. An electronic CVD risk visualisation tool containing multiple risk communication strategies (Your Heart Forecast) was designed in 2009.

**AIM:** To assess whether this tool facilitated explaining CVD risk to primary care patients.

**METHODS:** Health professionals who accessed a Primary Health Organisation website or who attended educational peer groups over a three-month period were invited to complete questionnaires before and after viewing a four-minute video about the tool. Respondents were asked to make an informed guess of the CVD risk of a 35-year-old patient (actual CVD risk 5%) and rate the following sentence as being true or false: 'If there were 100 people like Mr Andrews, five would go on to have a cardiac event in the next five years.' They also were asked to rank their understanding of CVD risk and confidence in explaining the concept to patients.

**RESULTS:** Fifty health professionals (37 GPs, 12 practice nurses, one other) completed before and after questionnaires. Respondents' CVD risk estimates pre-video ranged from <5% to 25% and nine rated the sentence as being false. After the video, all respondents answered these questions correctly. Personal rankings from zero to 10 about understanding CVD risk and confidence in explaining risk reduced in range and shifted towards greater efficacy.

**DISCUSSION:** Whether this tool facilitates discussions of CVD risk with patients and improves patient understanding and lifestyle behaviour needs to be evaluated in a randomised trial.

**KEYWORDS:** Cardiovascular disease; risk communication.

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## Introduction

It is now widely recognised that a cardiovascular disease (CVD) risk score based on multiple known risk factors is a much more accurate predictor of a future cardiovascular event than single risk factors such as high blood pressure alone.<sup>1</sup> Furthermore, the benefits from treatment are also directly proportional to pre-treatment CVD risk.<sup>1</sup>

However, without some sort of a risk calculator, estimating risk is difficult due to the need to integrate multiple risk factors (age, gender, blood

pressure level, total cholesterol to high-density lipoprotein ratio [TC/HDL], smoking and diabetes status).<sup>2</sup> Research has found that, without the aid of a risk calculator or decision tool, risk estimation is likely to be highly inaccurate with most doctors (and patients) greatly overestimating both CVD risk and benefits from management.<sup>3,4</sup> Furthermore, in New Zealand our current guidelines recommend factoring in family history of premature ischaemic CVD, a patient's self-identified ethnicity and other diabetes factors (microalbuminuria, duration of disease and HbA1c level).<sup>5</sup>

Once estimated, understanding and communicating risk is acknowledged as even more difficult.<sup>6</sup> How we understand and interpret information varies from individual to individual, depending on multiple factors such as different sets of values, worldviews, education, numeracy and degree of optimism/pessimism.<sup>7,8</sup> Patients differ greatly in their emotional response to risk messages, have preferences how (and by whom) information is conveyed, and different types of risk communication used will have varying capacity to influence behaviour.<sup>9–12</sup> Risk communication experts advocate communicating risk in multiple ways, using both positive and negative framing, substituting risks expressed as ‘odds’ that are often misunderstood (e.g. one in 25 people) with risks expressed as frequencies (e.g. four in 100 people) and, most importantly, using visual aids.<sup>6,7,9,10</sup>

We have had colour charts (and electronic calculators) to estimate risk since the mid-1990s in New Zealand.<sup>13,14</sup> This has enabled various strategies for communicating risk—verbal description (mild, moderate, high), a number expressed as a percentage (e.g. 5%, 10%, 20%) and a colour code (blue, green, yellow, orange, red). Risk can be framed either negatively or positively; ‘five in every 100 people like you are predicted to have a CVD event such as a heart attack or stroke in the next five years’ OR ‘95 out of 100 people like you won’t experience a CVD event in the next five years’. However, we still face two major problems. Firstly, unlike many clinical conditions, we are using a tool to communicate an abstract concept, a probability of an event not for today but sometime in the next five years. Abstract concepts often mean different things to different people and uncertainties are hard to communicate.<sup>8,11</sup> Secondly, CVD risk is strongly determined by one’s chronological age.<sup>2</sup> Using five-year CVD risk estimates for younger adults will invariably result in a low risk score even if they smoke, have high blood pressure and disordered lipids. It is very hard to motivate lifestyle changes such as losing weight, stopping smoking and increasing physical activity if we can only give patients a very favourable short-term report. Recent European CVD guidelines have offered one approach to this issue.<sup>15</sup> Their SCORE colour charts estimating the risk of a fatal CVD event also give an indication of how a patient’s risk compares to

## WHAT GAP THIS FILLS

**What we already know:** Without a calculator, accurate estimation of absolute CVD risk is difficult. Once estimated, being able to understand and explain to patients what it means and engage in shared decision-making regarding risk factor modification can be challenging.

**What this study adds:** An electronic tool that combines multiple metrics of risk and is displayed in a dynamic graphical story supports practitioner understanding and confidence in CVD risk communication.

an age- and gender-specific peer.<sup>15</sup> However, while the aim was to ‘flag’ persons who will become high risk, the guidelines warned that, if interpreted too literally, it might lead to excessive use of drug treatment in young people.<sup>15</sup>

In 2008, we (SW and AK) came up with a new approach to support CVD risk communication and behaviour change—Your Heart Forecast.<sup>16</sup> This provides a graphical story:

- starting with current CVD risk (where you are now),
- how your CVD risk compares to a peer with ideal risk factor control (your arterial age or heart age),
- what happens to your risk as you get older if you make no changes (Your Heart Forecast), and
- what would happen to your risk in future if you were able to make changes (e.g. stop smoking).

Your Heart Forecast is simultaneously comprehensive and simple, capturing both short-term and long-term risk as well as risk relative to a peer. The development of the tool by IT experts at Enigma Publishing Ltd was funded by the New Zealand Heart Foundation and made widely and freely available (<http://www.yourheartforecast.org.nz/>).

The aim of this study was to assess whether the provision of this tool to GPs and practice nurses facilitated understanding of CVD risk and confidence in explaining risk to patients.

## Methods

We designed a cross-sectional intervention study where each individual was their own control pre- and post-intervention. In collaboration with ProCare Health Ltd, one author (SW) recorded

a four-minute video clip presenting Your Heart Forecast using a fictitious patient, Mr Andrews. He is a 35-year-old, European smoker, with no diabetes but BP 150/80 and TC/HDL ratio 5.7. His calculated five-year CVD risk was 5%.

Participants were asked to complete a short anonymous questionnaire before and after seeing the video clip. At the beginning of the 'before' questionnaire, respondents were asked their age, gender, occupational status (GP, nurse, pharmacist, other health professional) and if they had previously seen Your Heart Forecast. They were then given a short written scenario that described Mr Andrews (as above), and asked to estimate his CVD risk. On a separate page, the questionnaire then asked whether the following sentence was true or false: 'If there were 100 people like Mr Andrews, five would go on to have a cardiac event in the next five years.' Lastly they were asked to rank how well they felt they understood CVD risk on a scale between 0 and 10 (0 being 'do not understand at all' to 10 being 'understand completely'), and how confident (ranked between 0 and 10) they would feel explaining risk to a patient. The 'after' questionnaire was exactly the same except that it did not ask for demographic details nor whether they had previously seen the Your Heart Forecast tool.

Table 1. Mode of completion of questionnaire and characteristics of respondents

	Total N=50
<b>Completion of questionnaire</b>	
Online	5
Peer group (CME/CNE)	45
<b>Gender</b>	
Male	15
Female	35
<b>Age group</b>	
30–39 years	6
40–49 years	15
50–59 years	20
60–69 years	7
70 years or more	2
<b>Occupation</b>	
Doctor	37
Nurse	12
Other health professional	1

The video clip and before–after questionnaires were published on the ProCare website from late July 2009 for viewing and online completion, as well as being offered to continuing medical and nursing educational (CME/CNE) peer groups in September, October and November 2009 for paper-based completion. While the CME group completion was able to be done anonymously via allocating a number to each respondent to attach to both before and after questionnaires, the ProCare website used individual log-ins.

## Analysis

Paper-based and online data from before and after questionnaires were entered into a Microsoft Office Excel spreadsheet. Paired data from each respondent was analysed to assess the change in scores. The Wilcoxon signed-rank test was applied to test if these changes were statistically significant. Pearson's correlation coefficients were calculated between CVD risk estimation and understanding and confidence in explaining CVD risk prior to viewing Your Heart Forecast video.

## Ethical approval

The study was approved by Northern Region Ethics Committee X in 2009 (NTX/09/34/EXP).

## Results

While Your Heart Forecast quiz has been viewed online many times by ProCare members (over 400 hits between July 2009 and February 2010), only five respondents (four doctors and one other health professional working within a general practice) completed both the before and after questionnaires via the website (Table 1). In three months of educational peer groups an additional 45 participants completed the questionnaires. The majority were female (70%), doctors (74%) and mainly less than 60 years old (82%).

Only one health professional indicated that they had seen the tool prior to the study. Before watching the video, the respondents estimated the CVD risk of the patient using the risk group options provided—less than 5%, 5–9%, 10–14%, 15–19%, 20–24%, 25–29% and over 30%. Most of the respondents (36/50) estimated Mr Andrews's

risk at either less than 5% or 5–9%. However 14 (eight doctors and six nurses) estimated that the patient's CVD risk was over 10%, with seven estimating Mr Andrews's risk as being over 15% five-year CVD risk (four estimating over 20% five-year CVD risk). After the video all respondents answered the CVD risk question correctly.

After being given the correct calculated CVD risk for Mr Andrews (5% five-year CVD risk), respondents were asked to rate the following sentence as being true or false: 'If there were 100 people like Mr Andrews, five would go on to have a cardiac event in the next five years.' Prior to watching the video, nine respondents (five doctors and four nurses/other health professional) rated this statement as false. After the video all respondents answered this question as correct.

The personal rankings to the question, 'How well do you feel you understand Mr Andrews's cardiac risk?' before and after watching Your Heart Forecast video are displayed in Figure 1. The range of scores for understanding CVD risk reduced afterwards and moved towards more understanding.

Changes in paired individuals' scores were evaluated before and after the video (Figure 2). One person lowered their understanding score by one on the 11-point scale. While many (18/47) rated their understanding as the same or one point higher after the video, 11/47 shifted their score two points higher and a further 17/50 shifted their scores three to seven points higher. This change in paired scores towards more understanding was statistically significant (signed-rank test statistic 329;  $p < 0.0001$ ).

The second personal ranking question asked: 'How confident would you feel explaining Mr Andrews's risk to him?' before and after watching Your Heart Forecast video (Figure 3).

For this group of health professionals, the distribution of confidence rankings reduced in range and shifted to the right after watching the video—towards gaining more confidence.

The change in individual confidence scores after watching the video is shown in Figure 4.

Two people had less confidence explaining CVD risk after the video (by one point). While 22/47

Figure 1. Personal rankings to the question, 'How well do you feel you understand Mr Andrews's cardiac risk?' before and after watching Your Heart Forecast video\*

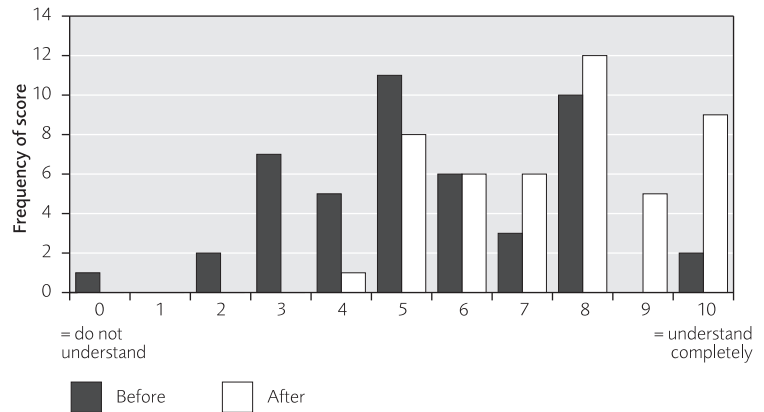


Figure 2. Change in scores for understanding CVD risk after watching the video.\*

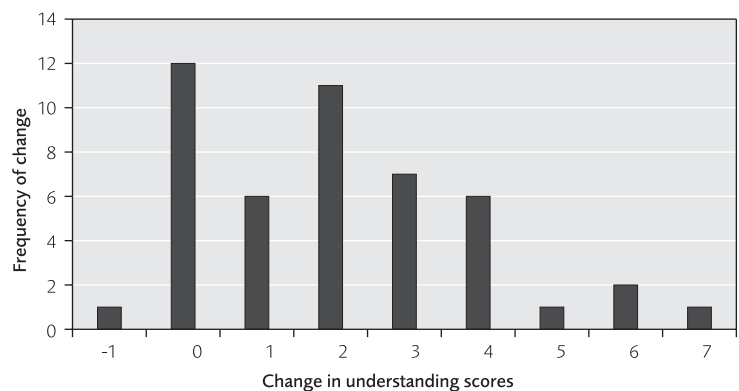
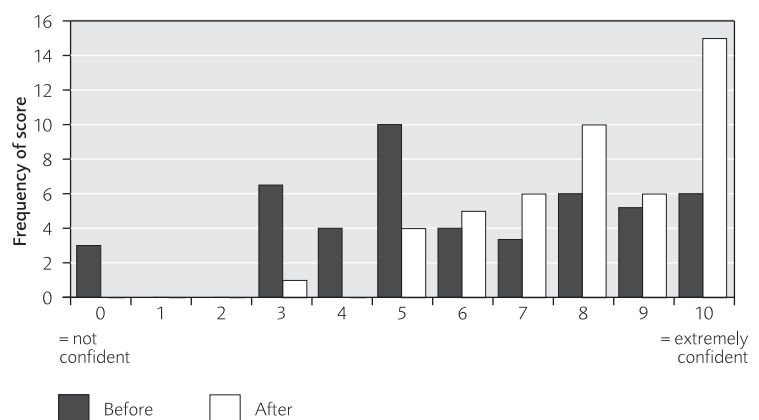


Figure 3. Personal rankings to the question, 'How confident would you feel explaining Mr Andrews's risk to him?' before and after watching Your Heart Forecast video\*



\* Based on 47 paired responses

participants rated their confidence in explaining risk the same or one point higher after the video as before, 7/47 shifted their score two points higher and a further 16 shifted their scores three to eight points higher. This change in paired scores towards more confidence with explaining CVD risk was statistically significant (signed-rank test statistic 269.5;  $p < 0.0001$ ).

An individual's understanding score was highly correlated with their confidence score before viewing the Your Heart Forecast video (Pearson's correlation coefficient 0.8  $p < 0.0001$ ). The higher the understanding score (from 0 to 10), the lower the estimated CVD risk group (Pearson's correlation coefficient -0.43  $p = 0.002$ ). The correlation between confidence score and risk group was similar (Pearson's correlation coefficient -0.41  $p = 0.004$ ).

## Discussion

In this sample of health professionals, participants demonstrated a range of self-reported understanding and confidence in CVD risk and that range both narrowed and shifted towards greater understanding and confidence post-Your Heart Forecast tool which was encouraging.

The sampling strategy was twofold via self-completion questionnaire either online or during routine monthly GP and nurse educational peer groups. The second strategy was the more successful, with very few health professionals who accessed the Your Heart Forecast video via the website choosing to complete the question-

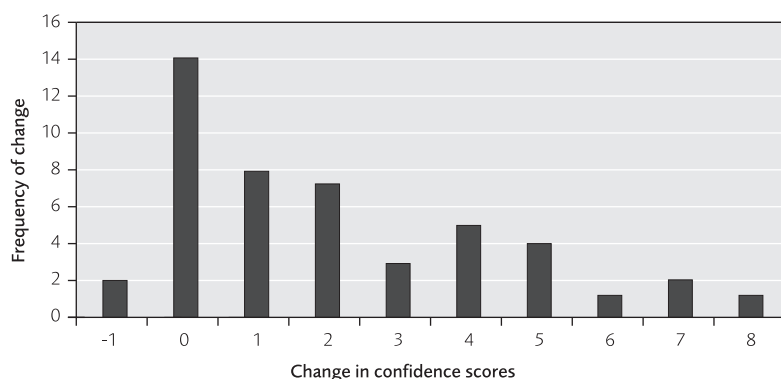
naires. This response rate online may have been influenced by the lack of anonymity afforded by the member-only website with identifiable log-in details. Specific studies on adoption of expert systems and computerised physician order entry systems have described distinct user groups that adopt IT tools.<sup>17-19</sup> In this small study the respondents were heterogeneous in age, gender and were mostly GPs. The sampling was pragmatic and cannot be assumed to be representative of doctors and nurses in the Primary Health Organisation or New Zealand.

Guessing a person's CVD risk does not reflect usual CVD risk assessment practice in New Zealand given the widespread availability of paper-based and electronic CVD calculators. However, it was included in the questionnaire to investigate whether such a routine practice recommended over the last 15 years would result in more accurate estimation. However, as previously noted in the literature, over one-third of the respondents overestimated the five-year CVD risk.<sup>3,4</sup>

While using a CVD risk prediction score such as one derived from the Framingham Heart Study<sup>20</sup> has been found to be more accurate than physicians' intuitive estimates of the probability of a future event for their patients, studies internationally<sup>21-24</sup> and in New Zealand<sup>25</sup> suggest that the risk prediction scores derived from Framingham have only modest accuracy. There are also increasing concerns about the validity of using Framingham-based scores among high risk ethnic groups, those who are socioeconomically deprived, people over 75 years, people with diabetes or those patients who are already on treatment at the time of risk assessment.<sup>5</sup> A strength of the Heart Forecast approach is that it is relatively easy to replace the current prediction equation with new or updated New Zealand-specific equations.

While respondents acted as their own control, there are several other limitations of this study. Firstly, the main outcome measures were self-reported and may have been influenced by individual factors and the peer group setting. While CVD risk assessment was not the topic of the educational meetings during the time period of the study, there have been multiple other opportunities to gain skills and confidence in

Figure 4. Change in scores for confidence in explaining CVD risk after watching the video.





CVD risk assessment communication in general practice. No other comparative studies for clinicians are available as Your Heart Forecast was only developed in 2008 and, at present, only tailored for New Zealand guidelines. Educational theory (Bloom's Taxonomy) supports the premise that those who have basic knowledge (in this case about CVD risk) can be supported to scaffold new pieces of information to develop comprehension and allow application and synthesis.<sup>26</sup> Your Heart Forecast keeps the strengths of the colour charts (colour, numbers and verbal description) but adds three new strategies: relative risk (your current risk relative to the ideal), your arterial or heart age that compares a patient's chronological age with the age of a person with the same CVD risk but ideal risk factors, and a longer-term perspective so that patients can see where they are heading, even when they are at present at low five-year CVD risk. Confidence in explaining risk is underpinned by self-efficacy theory.<sup>27</sup> We are more motivated to take on a task if we believe we can succeed. Self-efficacy is also associated with educational attainment and performance achievement.<sup>27</sup>

In this study, understanding of CVD risk and confidence were highly correlated and there was a significant shift in scores after watching Your Heart Forecast. However, we do not know whether Your Heart Forecast would be translated into improved discussions of CVD risk with a patient and more rational use of risk-lowering interventions. We plan to evaluate the impact on patient understanding and lifestyle behaviour in a randomised controlled trial in the near future.

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## COMPETING INTERESTS

The authors have no financial interest in Your Heart Forecast.